

ABSTRACT

An integrated circuit may include a receiver and/or a transmitter that performs third order sub-harmonic conversion. The integrated circuit may include a Gilbert cell active mixer with three or more serially-connected transistors in each of the mixer's four branches. Alternatively, the integrated circuit may include a quad-ring passive resistive mixer with three or more serially-connected transistors in each of the mixer's four branches. Alternatively, the integrated circuit may include a logic circuit and a mixer. The logic circuit may apply logic operations to periodic logic signals having a local frequency and to delayed versions thereof to produce reference signals having a dominant spectral component at three times the local frequency. The mixer may mix input signals with the reference signals to produce output signals having a dominant spectral component at three times the local frequency less a center frequency of the input signals.